

A Focal Press Book

4TH EDITION



CONCERT LIGHTING

THE ART AND BUSINESS OF ENTERTAINMENT LIGHTING

JAMES L. MOODY AND PAUL DEXTER

Concert Lighting

Concert Lighting: The Art and Business of Entertainment Lighting, Fourth Edition, provides readers with an updated look at how to succeed in the complex world of lighting design and technology. This edition is organized into three comprehensive sections that cover history, equipment and technology, and design. It contains new information on architainment, LED technology, pixel mapping, projection options, media servers, automated lighting, solutions for moving lights, DMX, Ethernet problems, and designer communication and collaboration. This book also explores the cross-media use of concert lighting techniques in film, video, theatre, and the corporate world, highlighted with advice from master designers such as Bruce Rodgers, Cosmo Wilson, and Sarah Landau. From securing precious contracts to choosing the best equipment to design a show, *Concert Lighting* covers everything a designer needs to know about working in the concert and related industries.

Jim Moody is the Head of the Technical Theatre Program, Technical Director, and Lighting Designer for The Theatre Academy at Los Angeles City College (A Professional Conservatory Program). He is considered one of the founders of concert lighting, as he received the first Concert Lighting Designer of the Year Award from *Performance* magazine in 1980. Also active in television, his work has been recognized with two Emmy nominations and one team award.

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Concert Lighting

The Art and Business of Entertainment Lighting

FOURTH EDITION

James L. Moody

Paul Dexter

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I will always appreciate and honor the support and love of my wife, Trudie.

—James L. Moody

Thank you to my support, my rock and caring, loving, understanding, and ever so patient wife, Susan.

—Paul Dexter



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Foreword

The era in which I began my career—the early 1970s—was a golden age for a young lighting designer to be starting out, and one rich in opportunity. Although theatrical lighting was an established discipline, lighting for rock concerts was a new game and to be one of the early players was to be part of a special club. There were few rules then and the equipment that we had to work with was rudimentary. We simply made stuff up as we went along, learning by trial and error and celebrating new and exciting ideas as they developed organically around us.

Much has changed since then and in this, their fourth edition of the book, James Moody and Paul Dexter clearly trace the origins of entertainment lighting and the path of its developments. Using their years of practice in the field they bring us right up to date with not only the technology and techniques that are now available to the young designer, but also with the etiquette and indeed the philosophy needed to sustain a career in the business of lighting.

As well as being a collaborative sport, lighting design is also a very personal one, and so the idea of a textbook is almost counter-intuitive to its proponents. After all, how can you possibly teach someone whether the stage should be a certain colour for a particular a song?

But the point here is that there is as much Craft in lighting as there is Art. Knowing how something works or why it should be done in a certain way, gives us a framework within which to work and consequently we discover the freedom to be more confident with our imagination.

Light, in its different and beautiful guises, is all around us. If you have picked up this book to learn, you will soon discover what a joy and a privilege it is to be among those who have chosen the same path. Welcome aboard!

Patrick Woodroffe
Bath, England 2015



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Preface

Here we are with the fourth edition of this series and again, the industry has undergone phenomenal changes both in growth, consolidation, and amazing new products. In the growth area we see not only company and tour size multiplying but the markets that the skills and equipment detailed in this book have moved to even wider horizons. I said in the first edition that theatre lighting people could no longer market their services only to local theatres, the League of Regional Theatres, and Broadway companies but should add concert artists. Ever expanding on that theme comes inclusion in casinos, cruise ships, electronic dance music, architecture, corporate events, and archtainment.

In ensuing editions were added television, houses of worship, and theme parks. That is why the subtitle of the series has changed from *Techniques, Art and Business* to *The Art and Business of Entertainment Lighting*. We hope you will find this book useful in developing resources for all media. Please do not leave out theatre. The third edition covered Broadway with a feature on famed lighting designer, Richard Pilbrow, and there have been many others who embrace these concert-inspired techniques such as on *American Idiot*, which won a Tony and is covered in this edition.

Concert lighting is the focus and continues to remain true to its craft—illuminating the performing artist by utilizing the latest tools and design systems to bring to life the scenic elements, complement the music and, let's face it, the artists' egos. We control smoke, haze, lasers, video graphics, strobe lights, moving lights, air graphics, conventional lights, and spotlights in a concert. However, all the ancillary media discussed in this book bears a striking resemblance to what the audiences want in today's other live and recorded entertainment. The evolution of touring music has moved from the baby boomers of the 1960s right on through to the Z-Boomers after 2001. You could blame work ethics, popular culture, world views, and family values, or lack of them, as playing a large role in why entertainment lighting has grown and changed.

One other issue to bring to the fore. In the last edition there was a point made that there was a change in

nomenclature by several of the lighting manufacturers from "lighting fixture" to "luminaire." In the past five years that term has not caught on widely. Yes, there are companies such as Vari*Lite that still use it. So, what you will find in this edition is that we designate all "non-moving" fixtures as Lighting Fixtures and all moving fixtures as Luminaires.

This generation is building on the techniques of the past 50 years. This edition will also start with the history of concert lighting, but will move both forward and backward. Backward to the Light Shows in the days of the Fillmore East and West to the 12-hour long Electronic Dance Music shows of today. From using light to sculpt buildings, bridges, and public art to the proliferation of moving lights (ML) on television shows; talk shows, game shows, and musical acts. LEDs have also recently invaded television and film production.

We have continued a tradition of listing all the companies we can find that make everything from conventional fixtures to fans to media servers. There is no way we can cover all the manufacturers and if your favorite is not discussed in detail, you can look them up using our charts and their email addresses enclosed.

We would like to personally thank the editors and publisher for all their support and encouragement. Meredith Darnell, Editorial Assistant, Dana Taylor, Technical Editor, and Stacey Walker as Editor, and all the other people and departments at Taylor & Francis Publishing.

There is currently no area of recorded or live entertainment in which the techniques and equipment detailed in this book have not been utilized. This is good news if you are aspiring to be part of one of the many forms of theatrical lighting or you are currently working in a lighting capacity and are looking to branch out. All disciplines in lighting require a team of people to create, organize, and implement a finish design. And if you need it, there are professional training courses and certifications available. Apart from official certification from colleges and trade organizations there is always the tried and true OJT (on-job-training). Working with light is usually stimulated by passion for the craft. Networking and a good reputation will keep you challenged, growing, and busy for many

Preface

years. You may discover that your design skills, technical knowledge, and organizational skills in one area will likely be transferable to qualify you in other areas and you may

find a niche area you never even thought of to excel in your career goals.

James Moody
Paul Dexter

Photo by Mike Brodey



James L. Moody is the Head of the Technical Theatre Program, Technical Director, and Lighting Designer for The Theatre Academy at Los Angeles City College (A Professional Conservatory Program). He is considered one of the founders of concert light-

ing, as he received the first Concert Lighting Designer of the Year Award from *Performance* magazine in 1980. Early in his career he moved into Las Vegas venues along with many of his touring artists, and even won Las Vegas Designer of the Year in 1982 for “Dream Street,” a production show. Also active in television, his work has been recognized with two Emmy nominations and one team award.

He served for 10 years as Director of Photography on *Entertainment Tonight* and then switched to *Jeopardy!* and *Wheel of Fortune* for 12 years. Jim is a member of both USA 829 (Theatrical Lighting Designer) and IA 600 (Directors of Photography). He has written *The Business of Theatrical Design* in addition to the previous three editions of *Concert Lighting: Techniques, Art and Business*.

In theatre, Jim has designed lighting for over 400 productions. Jim has also received several theatre design awards including the Drama Logue Award and a Los Angeles Theatre Critics Award. He was awarded the Distinguished Achievement Award in Lighting Design from the United States Institute for Theatre Technology. He has also been honored as a Fellow of the Institute. In 2014 he was granted a Fellow at the Hong Kong Academy of Performing Arts.

Jim is a United States Air Force Vietnam veteran as an air traffic controller. He is also a 25-year member of the United States Coast Guard Auxiliary assigned to duty at Coast Guard Station Channel Islands Harbor as a member of the boat forces team.

Photo by Susan Dexter



Paul Dexter began lighting in Los Angeles when he was 16 (1970). Paul made 42 Hawaiian Pineapple cans into lights and operated them with crude double pole switches. At 18 he was asked to tour with Elvis Presley, which began a colorful history of world-

wide concert touring as a lighting and stage set designer with the likes of Rick James, Motley Crue, DIO, Ozzy Osbourne, Triumph, REO Speedwagon, Benatar/Giraldo, Black Sabbath, Aerosmith, and Elton John.

From 1973–1990 Paul’s interests diversified into film and video and he was the lighting designer/director for seven long-form concert DVDs and several MTV 1980s rotation videos. He was the lighting designer for Fuji TV’s live 1990 studio broadcasts from London to Japan with artists such as Paul McCartney and Rod Stewart; a live broadcast for European cable channel Sky TV—“Elton John, Live from Verona”; the movie *Rock Star* and scenes from ABC Movie of the Week, *These Ol’ Broads* with Elizabeth Taylor and Shirley MacLaine. Paul has written a screenplay, “RockHard”; he has over 80 industry articles published, including his column, “Smoke & Mirrors”, for *Pollstar* magazine; and he was the contributing writer for the Third Edition *Concert Lighting* book series.

Paul is president of his own design firm, Masterworks Design, Inc. His recent activities include touring the world with REO Speedwagon as production and lighting designer/director and production designer, and scriptwriter for the Las Vegas production, *Raiding the Rock Vault*.



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I

BACKGROUND AND ORGANIZATION



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1

THE RISE OF THE CONCERT
LIGHTING FIELD

It is difficult to pinpoint the actual beginning of concert lighting as we think of it today. Certainly the *Grand Tour* could be seen as having been the byproduct of opera in the mid-nineteenth century. The term was often given to a star's travels through Europe, presenting solo programs in the European cultural capitals. Later, the Grand Tour came to the Americas. Through the years it also came to include the popular figures of show business, encompassing not only opera but also the stars of dance halls, vaudeville, and the circus. In the late nineteenth century, despite their isolated locations, even small Nevada gold rush towns had opera houses to show the world how "cultured" they had become.

The swing bands of the 1920s and 1930s brought a big change to popular music and, some believe, sounded the first notes that would ultimately be recognized as *rock & roll*. Led by such greats as Duke Ellington, Count Basie, and Paul Whiteman, these bands emphasized instrumental solos—riffing, or playing a short phrase over and over, now considered a key ingredient of rock & roll.

Another milestone was the entrance of the *pop idol*. Although Benny Goodman is widely credited for igniting the first "teen hysteria" in 1938 at a Carnegie Hall concert, it would later be a teenager from Hoboken, New Jersey, Francis Albert Sinatra, who would endure a legion of young teenage girls screaming during his performances.

Enter the baby boom of the 1940s. Postwar American prosperity saw many cultural changes. An avalanche of consumer products became available

to the average family, and the money to buy these products was also available in the boom of the postwar years. There was also a change in who had purchasing power. Before World War II, the head of the household made the purchase decisions for the family, but by the early 1950s manufacturers were witnessing the growing financial power of the teen market. Teenagers now had allowances, and it was estimated in a 1951 survey that they had \$4.5 billion dollars to spend annually. It was estimated that \$45 million of that was spent on 45 rpm single records. In the early 1960s, a large number of these war babies, who were 16 to 19 years of age, married, and their buying power increased even more. Producers and manufacturers were eager to figure out what this emerging class wanted to purchase.

Teens' listening tastes were having a decided impact on the music business. Disc jockeys could play a tremendous part in record sales, but it still was unclear what teens wanted. Stations relegated blues and country music to times when few adults listened. These listeners became known as the "late people." To be a disc jockey, you simply needed a sponsor, no experience required. One of these original late-night programs was called *King Biscuit Time* and aired on KFFA in Helena, Arkansas, and a disc jockey calling himself Howlin' Wolf had a show on KWEM in West Memphis, Arkansas. Both played blues and some country artists. Because this kind of music was not mainstream, the shows aired between 5 a.m. and 6 a.m.¹

¹ Ed Ward, Geoffrey Stokes, and Ken Tucker, *Rock of Ages: The Rolling Stone History of Rock & Roll* (New York: Rolling Stone Press, 1986), pp. 68–70.

It may have been more than luck that these programs aired on what were called 50,000-watt “clear-channel” stations. With that kind of power and the phenomenon of AM signal skip due to the ozone, on a clear night, when the conditions in the ionosphere were right, you could hear stations that had “skipped” thousands of miles. Teens in Arizona might hear their first Mississippi Delta Blues from a station in Tennessee, or a group of teens in Wisconsin could tune in to hear young country singers like Carl Perkins or Buddy Holly.

Blacks owned no radio stations; white disc jockeys opened the doors to what was almost a secret society of black music and culture. Admittedly, it was a forced secret because of racism and segregation, but it was a distinct musical style that appealed to the white teens with money to spend.

In Los Angeles, one of the most popular programs was called *Huntin’ with Hunter* on KGFJ featuring Hunter Hancock. His style was to mix blues, jazz, and spirituals with rhythm and blues. He was good friends with Johnny Otis, who owned a club called the Barrel House in a black section of Los Angeles called Watts. Teens began to flock to the club, white as well as black. Hancock’s machine-gun delivery, growling, use of hip slang, and general carrying on like a madman caught on with white teens. Before long Hancock’s program was transcribed to stations across the country. Hancock emphasized that he was bringing listeners the latest and greatest Negro performers. Although everyone assumed he was black, Hancock kept out of public view because he was white. Wolfman Jack later adopted Hancock’s style and for many years broadcast from a 50,000-watt station in Mexico without being seen in public. He had a tremendous influence on teens’ taste in music in the 1960s. In his early days, many people also thought Wolfman Jack was black. He created a mystique that was widely held until he portrayed himself in the classic George Lucas film, *American Graffiti*.

The melding of country music and such regional sounds as rhythm and blues had been building until, in 1951, a disc jockey named Alan Freed started the *Moondog Show* on WJW radio in Cleveland, Ohio. The name came from a tune by Todd Rhodes called “Blues for Moondog” that contained a wailing saxophone solo that Freed adopted as his theme song.

He’d leave the microphone open and howl like a coyote. It was demented and near anarchy, but it was what teens had been waiting to hear. In 1954, the name was changed to *The Rock and Roll Show*. *Rolling Stone* magazine wrote that the term was perfect because: “It was a way of distinguishing the new rhythm and blues from just plain blues and the old corny Mills Brothers style. After all, rock & roll didn’t fit into any of the old categories.”²

The benchmark of modern concert touring was set in the mid-1950s by the independent record companies in an effort to exploit the fledgling rock & roll recording artists. The tours were not a very radical departure from what swing bands and orchestras had been doing in the 1930s, 1940s, and 1950s—that is, playing dances in every town that had a community hall or theatre. After all, this was the way most musicians made their living—playing live dances. But now the pop singer was not just a member of the band; the singer, rather than the bandleader, came to front the band. Another change was that, rather than getting work through a booking agent separate from their manager, pop singers were promoted by an independent record producer, who also controlled the record, or sometimes an independent entrepreneur like Alan Freed. That way the record company made money not only from ticket sales but also, more importantly, by stimulating record sales. Many artists signed away their publishing rights for a small, one-time fee or were lied to by the record companies concerning a record’s earnings.

CONCERT LIGHTING BEGINS IN THE UNITED STATES

Lighting did not attain a prominent position until after sound reinforcement made its first inroads in about 1960. The inadequate sound system in most buildings could not handle the demands of the recording artists, who had come to expect studio-quality sound (not to mention the new electronic effects necessary to make their performances sound like the record).

² Ed Ward, Geoffrey Stokes, and Ken Tucker, *Rock of Ages: The Rolling Stone History of Rock & Roll* (New York: Rolling Stone Press, 1986), pp. 96–97.

After the artists got used to absorbing the expense of carrying sound equipment from city to city, lighting soon followed.

One of the first artists to carry their own lighting equipment was Harry Belafonte in the mid-1960s. He had emerged on the record scene in 1957 from his native Jamaica and was truly ahead of his time. Chip Monck (see Chapters 2 and 17) got his start with Harry. Generally, the middle-of-the-road (MOR) and country/western artists were the last to see the value of building a production around their music; however, folk acts such as the Chad Mitchell Trio, the Kingston Trio, and Peter, Paul, and Mary took notice of the added value that special lighting gave to the show and started hiring companies like McManus Enterprises in Philadelphia to provide lighting for their college dates.

THE SAN FRANCISCO LIGHT SHOW

What became known as 1960s *acid rock* was spearheaded by such bands as Big Brother and the Holding Company, Jefferson Airplane, Warlock, Grace Slick and the Great Society, and Quicksilver Messenger Service. All were based in San Francisco. Actually it was a nonmusical group, The Family Dog, at the close of 1965, who unwittingly created the first *light show*. Bill Graham, who was their manager, said that people would show up and ask if they could hang sheets on the walls, and he'd ask, "What are you talking about?" They would reply, "My screens; I'm a liquid projectionist." Light shows were not planned, and they were not even paid for. They were just part of what came together spontaneously. "Happenings" could include films, dance, music, mime, painting, and just about anything else people wanted to do, all going on at once.

Bill Graham was brought in to produce the now famous Trips Festival at the Longshoremen's Hall in January of 1966. Later that year, he rented the Fillmore Theatre at Fillmore and Geary from Charles Sullivan, who was black, to put on the second Mime Troupe benefit, but this production was billed as a "dance concert." After that, Graham could see live rock & roll music as being the main attraction. He

split from the Mime Troupe and started promoting musical groups on his own. Graham arranged concerts that featured individual bands as the main attraction without ancillary features. Films, however, were shown during the set changes to keep audiences occupied.

When he started formally promoting concerts, Bill Graham continued to welcome the light shows and eventually started paying for in-house light shows that he could control. They were a visual explosion of color and design. The shows were based on liquid light projections, strobe lights, blacklights, and effect lighting to create a visual mood into which the band as well as audience was immersed. The liquid light projector was nothing fancier than the opaque projector your grade school teacher used to show photos and charts from books. For these light shows, though, the book was replaced by a pan holding oil or water into which paints were pushed, splashed, and injected. The pan was vibrated or tilted to add even more movement to the ever-changing patterns that this mixture created. These images could be projected onto dancers, walls, screens, the audience, even the performers.

Graham was not interested specifically in advancing lighting or film or anything in particular, but he was a bulldog when it came to his beliefs about how the audience should be treated. His background and training in New York theatre gave Graham a belief that with music alone he could create an art form. He wanted the audience to have a great experience, and he felt as though he was the only person looking out for the audience. The bands often didn't care if there even was an audience. If a good experience for the audience meant better lighting and sound, he encouraged and supported it. Graham provided the opportunity for many early lighting designers to push their limits and experiment. He was known for treating the people around him as family. That included yelling at them when he felt it was necessary. Graham would conduct regular meetings before each show for everyone involved, including the ushers.

Lighting was not important in those early concerts because people came more to "make the scene" than to listen to any one band. But, as individual band recognition grew and people came to see specific bands play, Graham encouraged expansion of

production values as part of providing a better experience for the audience. Lighting had moved beyond the mask of the liquid light show.

OTHER CITIES AND VENUES

This is not to say that concert lighting did not exist outside of San Francisco. There were other venues at about the same time that received national attention. The Electric Factory in Philadelphia, circa 1967, was one. A very young Bill McManus fell into the role of local lighting guru by accident. A receptionist mistakenly sent a call meant for McManus's boss, MacAvoy, who was often called Mac, to a 19-year-old working in the shop of a theatrical lighting rental company. Bill "Mac" McManus saw an opportunity and met with a man who said he wanted to open "one of them psychedelic things." He had an old factory on 22nd and Arch and asked if Mac could look at it.

Before the Electric Factory opened, the largest live concert venue in town was the Latin Casino, which held about 3500 persons. The Electric Factory was to hold 5000, an unheard of size for its day. Field houses at universities held 5000 to 6000, and only a handful of artists dared perform in them. The Electric Factory was so successful that it was turning over the house (audience) two and three times a night.

Because of its experiences at the Fillmore, the Grateful Dead was one of the early bands to encourage light shows and film projection at its other gigs. A "family" quickly developed around the band. "People just started doing things, we just played and things happened. If it felt good we'd say do it next time," said Jerry Garcia in Graham's autobiography, *Bill Graham Presents*. Josh White noted, "Kip Cohen always said that the reason the light show worked so well was that musicians didn't realize that people had eyes as well as ears ... Jefferson Airplane would do twenty minute songs in the darkness in their street clothes with their backs to the audience."³

³ Bill Graham and Robert Greenfield, *Bill Graham Presents* (New York: Doubleday, 1992), p. 259.

FILLMORE EAST

Bob See recalled that while he was a student at New York University in the School of the Arts theatre program, he just happened to walk through an open door with a group of friends into an abandoned movie house near campus. There were Chip Monck and some of the people with Joshua Light Show on the stage trying to put things together:

We just kind of got involved. Because this was a real event, a real happening. From the standpoint that they were trying things that no one had ever tried before. It was the era of the '60s. So we started working there, Chris Langhart, Bob Goddard, and John Chester. And as the place evolved we sort of took on jobs. I became the technical director and did lighting stuff with Chip Monck (Bob See, personal interview, 1996).

The Fillmore East opened in 1968 in the old Commodore Theatre. It was at the last minute that the venue took that name. It was to have been called the Village Theatre, but because of a legal threat the name was changed to the Fillmore East after the handbills had been printed. The first show was on March 8, 1968, featuring Big Brother and the Holding Company with Janis Joplin, Tim Buckley, and Albert King, recalls Josh White. Across the street at the Anderson Theatre, Gladys Knight performed using Pablo's Lights.⁴

FLEDGLING LIGHTING IN ENGLAND

While all this was happening in the United States, England was experiencing a blues explosion. Bands devoured any record they could get of Muddy Waters, Lightning Hopkins, B.B. King, and many others. There was only a club scene, no large venues like those starting to appear in the United States. The Marquee Club in London and the Red Car Jazz Club,

⁴ Bill Graham and Robert Greenfield, *Bill Graham Presents* (New York: Doubleday, 1992), p. 232.

which was really a rock & roll club, were the places to play. The Round House, another club, catered to visiting American bands like The Doors during the early 1960s. Ian Peacock said, “I remember it was more of a place to hang out than to hear the bands” (personal interview, 1996). Because these clubs were more sophisticated in their equipment, would-be designers came to see and hear what they were doing.

Most often the British bands found themselves playing in community halls and school assembly rooms where there was no stage lighting. Follow spots were even rarer. The British bands were hearing and sometimes seeing what the Americans were doing in a few spots like the Fillmore, but the British lighting industry did not have the equipment available to meet the needs of this new media. Consequently, many early systems were designed around American lights. It was up to people like Michael Tait to invent what they needed.

Michael Tait was one of the early people to build lighting systems around the specific needs of a band. He started with YES in 1968. Tait had worked at a nightclub and somehow ended up driving the band somewhere. Tait says he just fell into the job. He started by doing anything the band needed. At first that included setting up their small public address sound system. In those days bands used only vocal microphones. No one thought of using microphones on the drums or guitars. Each band had its own sound system, so the crew completely changed that as well as the band gear after each set.

Tait remembers that the second show he worked was on a bill with The Who, Small Faces, Arthur Brown and the Mind Benders, and YES at the bottom of the bill. The show was in Newcastle, England, in the town hall. There might have been some white light above the stage, but that was all. Tim Murch, who was with Light and Sound Design for many years, remembers seeing Black Sabbath around 1970 in Southampton Guild Hall with only house lights.

Things developed slowly in England because the rather small audiences for most bands did not bring in enough money to support the band, let alone buy lighting. A few bands, such as The Who and Pink Floyd, were interested in production, but there still wasn't a lot of money to spend on such things, nor had the equipment been built to spend it on.

Other early British innovators were Jonathan Smeeton and Graham Flemming. Michael Tait remembered, and was echoed by Ian Peacock, that people just showed up and someone said, “OK, who's doing sound, who's doing lights tonight?” But soon, as in America, people gravitated to what they did best. No formal training, just desire and drive. “We were taking light bulbs and putting them in coffee cans,” said Tait. He mentioned getting 12 automobile fog lamps, attaching them to a piece of pipe, and connecting them to wire-wound potentiometers to make mini-dimmers. “They worked for a few months, but they kept melting. But they had the desired effect, you got a narrow beam of light across the front of the stage,” he said:

In the beginning, I didn't realize you need backlight and sidelight. I had them out front, and it looked flat and horrible. Then one day I couldn't find a place to attach my lights out front and hung them on the side. That's when I realized that side and backlight was what it was all about.

Tait's first go at lighting was at the Marquee Club, which had a red light and a blue light above the stage with switches on the wall. YES's music had a staccato effect that lent itself to the flashing of these lights in time with the music. People went wild. But Tait still didn't consider lighting to be his skill: “YES first toured America as the opening act for Jethro Tull. I forgot where the first gig was but somebody said, well who's going to call the follow spots? Well, we never had any, so I was the one messing with lights, so it had to be me.” He went on to say, “But I found I could do it. I found that I could cue four lights and that I knew what I wanted to do. It was just something that I just naturally could do.” (All quotes are from a personal interview with Michael Tait in 1996.)

MOVING TO LARGER VENUES

Although these early converted night clubs, auditoriums, and factories got concert lighting off the ground, their success was short lived. The Fillmore

was open from December 10, 1965, to the end of June 1968. The Fillmore East in the old Carousel Ballroom lasted from July 1968 until September 1971. Winterland in San Francisco became a Bill Graham venue before the Fillmore was closed so he could promote bands that demanded more money. It held 5400 people and had been built as a skating arena. It continued on for seven more years.

Don Law, a promoter in Boston, was using the old Boston Garden to put on concerts at about the same time as the Electric Factory opened in Philadelphia. Both had about 5000 seats. When the Spectrum (a basketball arena) opened in Philadelphia in 1969, it drew the big acts away from the Electric Factory. All across the country, more sports arenas were being used to attract the artists that demanded 5000 to 7000 seats. All this was significant to concert lighting because these new buildings were not full-time clubs or venues designed for music. Most of them were sports arenas. They were hostile environments with bad acoustics, no permanent stages, no theatrical lighting, no intercoms, and no music sound systems (only public address). Portable lighting and sound companies became necessary. Local and regional lighting and sound companies started to appear, and the large fees they could charge meant they could invest further in their equipment. Banks were not generally willing to approve loans for these ventures so most capital to buy equipment came directly from cash received from the previous gig. Some of the early companies included McManus Enterprises in Philadelphia, Sundance Lighting in Los Angeles, TFA in Boston, and See-Factor in New York. Today, only one of these companies is still on the national scene, See-Factor.

THE END OF BILL GRAHAM'S FILLMORES

Bob See recalls Bill Graham calling all the staff together—it was very much a family organization. Graham announced he was closing the Fillmore East even though every show was selling out. He said he just had too many irons in the fire. That was in 1971. The Fillmore East held only 2700 people. Acts were playing Madison Square Garden and making four

times what they could at the Fillmore; greed had set in. It all came down to dollars. Actually, all this didn't just happen by accident. The Monterey Festival took place in 1967 and Woodstock in 1969, and promoters realized that as many as 50,000 people would come to hear rock & roll music. Bill Graham closed the Fillmore East and went back to San Francisco to close the Fillmore. That last week in New York, Bob See remembers doing 28 shows in 27 days. The era of the concert hall as an ongoing venue was dying.

Bill Graham went on to promote and/or act as production manager for several national tours with the Rolling Stones, George Harrison, and Crosby, Stills, Nash, and Young, as well as Bob Dylan and the Band. To all these productions he brought his sense of theatricality, production values, and total dedication to making the event an experience for the public. Graham is quoted as follows in his autobiography:

The greatest compliment I was ever given was at the Fillmore. ...Two guys looked straight ahead and one said, "Oh, shit, man, I forgot. Who's playing here tonight?" Without batting an eyelash, the other guy said, "I don't know man. What's the difference? It's the Fillmore."⁵

Bill died in a helicopter crash on October 25, 1991, returning from a Huey Lewis and the News show at Concord Pavilion. His efforts to promote great shows and his undaunted belief that the public deserved the best show possible gave encouragement to many who worked directly with him or for his shows. Graham wanted bands to give their audience a total experience. He encouraged people to try new things and opened the door for many of those who started this special form of lighting. Bands wanted bigger and more, more, more. To attract a paying audience to large venues meant you had to give them a show, and the shows had to now go on the road.

MELDING FORMS

Concerts moved from light shows to embracing more traditional music hall lighting simply because certain

⁵ Bill Graham and Robert Greenfield, *Bill Graham Presents* (New York: Doubleday, 1992), p. 181.

performers began to emerge from these groups and gain star status. With this came audience recognition. I believe that the artist's ego was responsible for a move toward the more conventional musical comedy lighting techniques. Artists wanted to be in the spotlight, the traditional symbol of being a star.

As with any melding of the old with the new, and especially in light of the youth revolt of the 1960s, record artists started altering the rules. There was no comedian or animal act to separate the musical presentations as had been common in music halls or vaudeville. This was to be a show of solid music, lasting several hours. Lighting began to take on a more important role.

The greatest differences in concert lighting from traditional theatrical lighting are the use of vivid colors, heavy use of backlight, and absolute use of follow spots instead of balcony rail, toms, or front-of-house washes. The greatest advances have been in portable lighting structures, the PAR-64, the moving luminaire, and computerized lighting consoles.

EXPANSION BEYOND THE CONCERT FORMAT

The author observed back in the first edition of this book in 1989 that ways in which these new tools could be used to solve and expand lighting applications in other entertainment fields were only a dream at the time. Yet, it did not take long before many people saw the potential for adding fast, efficient, dramatic lighting to all sorts of productions: corporate presentations, theme parks, television, and film, as well as legitimate theatre. In this edition, we are pleased to showcase a recent Broadway show that has truly embraced the concert philosophy of bold color, high intensity, sophisticated computer lighting control, luminaires, programming tools, and dimming innovations.

There is no such thing as a bad decision; the only wrong decision is to make no decision.



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2

EARLY LIGHTING PIONEERS AND COMPANIES

Touring in the 1970s was like being in the Wild West without guns. There were a small number of equipment providers and regional promoters and everybody knew who the players were. The big corporations hadn't caught on yet as to how lucrative the touring business was becoming. "Roadies" (even though we may not like the term, it stuck) didn't think about savings accounts or health insurance and 401Ks didn't exist. There weren't any cell phones, computers, or cable TV either. If you needed to make a call you went to a phone booth. We moved around the country in our very insular world traveling together in commercial planes, rental cars, mobile homes, and buses. Roaming free, we had pockets full of cash and no rules.

When we started touring no one really imagined that it would be a great career. It was something we loved to do and audiences all over the world took an unforgettable memory with them, so we kept on touring. Lighting, staging, and audio became larger and more sophisticated. Year after year, there was one great band after another and those memorable songs became the sound track for an entire generation and for future generations.

Early sound and lighting companies were the pioneers of the rock & roll Wild West (Figure 2.1). The evolution of traveling production equipment was part of an unrepeatable time in music history. Rock bands ruled the radio waves and popularity soared because people connected with the expressive messages and raw stop-me-if-you-dare attitude that rock & roll had. Sound, lighting, and staging was born



FIGURE 2.1 Backstage at Shea Stadium, Grand Funk Railroad, 1971 (Photo by Stefan Graf)

out of the simple supply and demand theory because theatre and arenas all around the world were sold out everywhere. It was the right place and the right time if you were in the touring business.

Every tour was a new situation. Touring crews contributed and thought up innovative ideas to make something bigger, better, and faster to set up and tear down. The manufacturers kept up with the demand too, not only creating easier to manage and safer equipment, but interviewing road personnel to help them develop new products. The trend of using rock tours to develop and test equipment was the way it was done.

What follows are some of the early pioneers and their lighting companies, somewhat in a chronological order, or the best that the authors can ascertain as the very first entrepreneurs (or steered by blind faith), to recognize that a new and exciting market

had opened and they wanted to be a part of it. Most everyone we knew starting out in lighting were young, some in their teens and enthusiastic. There was no foundation, nor right or wrong because it had never been done before.

The excerpts below are not referenced from other books or internet information, but are all from actual interviews of first hand experiences from those featured in this chapter. Initially, there were only a few core people that were, coincidentally, working concurrently in worldwide locations New York, Los Angeles, Dallas, Knoxville, Philadelphia, and London. These pioneers were responsible for early lighting developments, provided the basis for design, all mobile lighting and audio equipment, scenic, rigging systems, and special effects, and they formed new companies to do so. This is our history.

CHIP MONCK (FILLMORE EAST AND WEST)

Chip Monck is arguably the first lighting designer for rock & roll, most notably for the 1967 Monterey Pop Festival (Figure 2.2), the 1969 Woodstock Festival, and the 1971 Rolling Stones tour (Figure 2.3). He is mentioned throughout this book that attribute his trailblazer contributions, laying the groundwork that had cause and effect for new innovations as well as raising the work ethics bar—to be as good as you possibly can be.



FIGURE 2.2 Monterey Pop Festival, 1967 (Photo by Chip Monck)



FIGURE 2.3 Rolling Stones system set up, Newcastle City Hall, 1971 (Photo by Chip Monck)

“Chip arrived at the Fillmore [Figure 2.4] with his usual gusto and background in lighting legitimate shows from college times,” Chris Langhart said:

“After lighting a lot of West Village nightclubs he developed a pattern and a color system which he widely recommended. This revolved around six Rosco colors and a basic collection of Altman 2K’s and Lekos. Initially there were no PAR cans. Chip saw the usefulness, narrow beam and power output of the 1K PAR bulb, used in movie lighting, and he went to Altman’s and suggested they make a housing for it. This became the black steel PAR Can.”

Dimming at the Fillmore was six Luxtrol 2500w auto transformer packs, six dimmers each with plastic



FIGURE 2.4 Inside the Fillmore East, 1970 (Photo by Chip Monck)



FIGURE 2.5 Chip Monck at Shea Stadium, 1971 (Photo by Stefan Graf)

colored handles. Chip Monck was very keen on music timing and insisted on having a clean blackout. He resolved this by building a Square D rocker switch disconnect on the floor and when the moment came he could step on it and then “return,” bringing lights all back up to the previous setting. The black out could never have been accomplished with 36 dimmer handles.

Before the Chaos intercom, for calling follow spots, Chip used an Altec 15-67 mixer with every headset mic having an input and a home run mic cable and all earphones being paralleled on the output of an amplifier. He was an expert at follow spot calling. He knew what he wanted in advance to get a good operator, or knew how to group them in a big arena such as Madison Square Garden, to produce the best results (Figure 2.5).¹

Chip Monck lives in Melbourne Australia and continues to work in lighting for corporate and retail.²

¹ Interview (2015) with Chip Monck, Fillmore East.

² Interview (2015) with Chris Langhart, NYU, TD Fillmore.

CHRIS LANGHART (FILLMORE EAST, THE RAINBOW)

Among the early innovators in lighting, rigging, staging, and sound that help shaped rock & roll production was Chris Langhart. Chris was the technical mind that made significant production contributions to the Fillmore East, the Rainbow in London, Woodstock, the Wings tour of Europe with Paul McCartney, Jefferson Airplane, and any other show or event with which he was involved. Chris created much of the production values that are the touring music business today.

Teaching and mentoring others, Chris’ classes at New York University (NYU) theatre program in the late 1960s gave rise to students and future entrepreneurs, Richard Hartman, Bob See, John Tedesco, John Chester, Bob Goddard, and Michael Ahern (Figure 2.6). Jules Fisher was the chief lighting design teacher at the time and Chris was the technical director for the theatre department with curriculum in electrics mechanics, rigging, the electronics of dimmers, gears, hydraulics, pneumatics, welding, and technical drawing in the days before AutoCAD. The NYU department encouraged innovation in technology that would enhance stagecraft.

Outside of NYU, Chris was proactive in designing and constructing theatre stages, and specialized in early automation and technical problem solving. He was perceptive enough to design a system and lay



FIGURE 2.6 Bob See and Chris Langhart, 1969 (Photo by Amalie R. Rothschild)

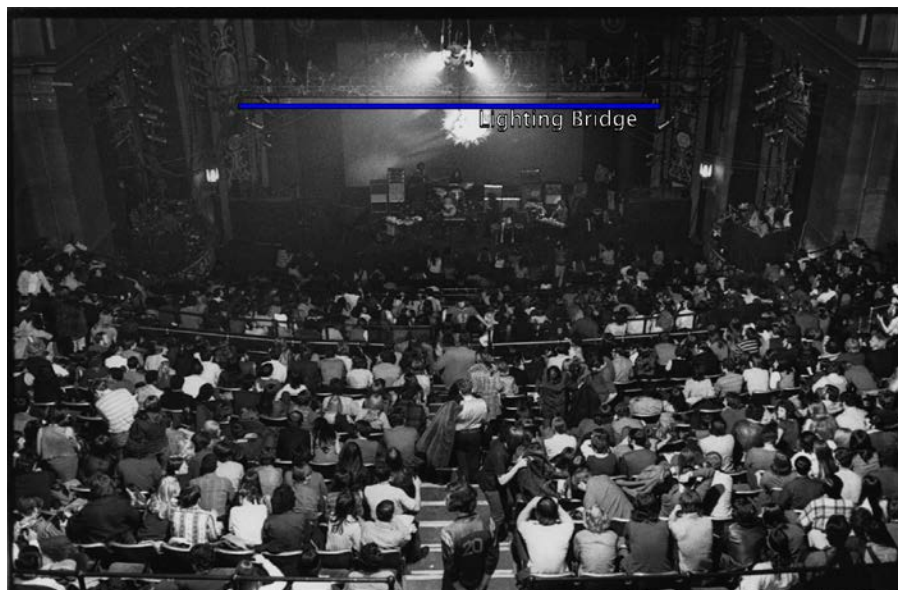


FIGURE 2.7 Fillmore East with full house and front lighting bridge (Photo by Amalie R. Rothschild)

miles of underground PVC pipe at Woodstock for the entire site's temporary water system.³ He was technical director for the Fillmore East and the Rainbow during their crucial renovation periods, and toured as the first production manager for the Jefferson Airplane.

Before the Fillmore opened, staging and rigging renovations were under Chris's direction. Chris rigged a front of house pipe for Chip Monck's lighting position specifications; flown for high angle ellipsoids, a way to keep light off of the screen (Figure 2.7). Backlighting was not used in the early days of the Fillmore for this reason. On the front of the light show booth, however, there were five or six PAR 38 Mercury vapor lamps with deep blue filters, which backlit the light show screen and provided a color wash against which other things could be projected. Chris designed, engineered, and constructed the custom framing for the massive curved projection screen for *Joshua Light Show* (Figure 2.8). An NYU student at the time, *Bob See* was in charge of the construction, with Chris' design and supervision of downstage apron to the existing stage to provide more room in front of the light show screen for the bands. After a year and a half Bob See became the official technical director of the Fillmore East.

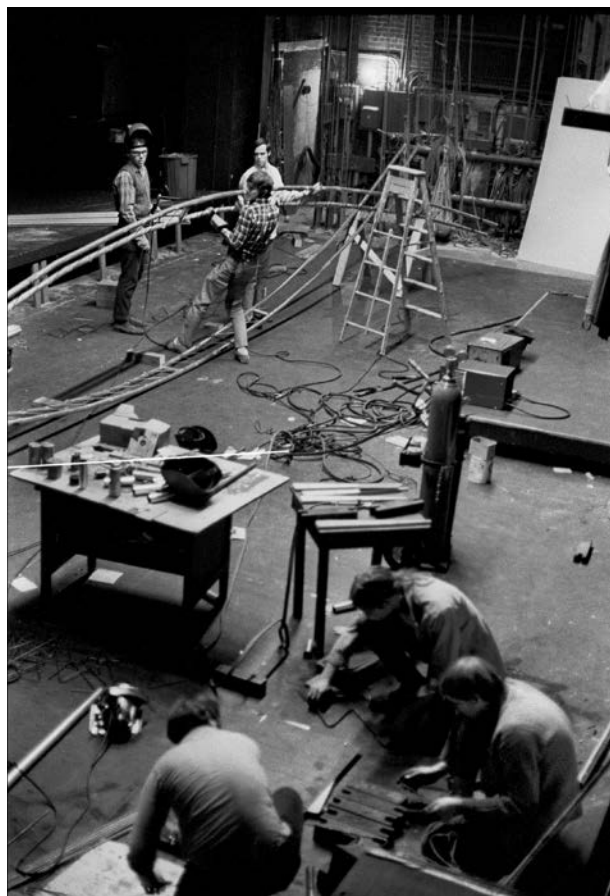


FIGURE 2.8 Curved light screen construction (Photo by Amalie R. Rothschild)

³ Interview (2015) with John Morris, Promoter, Carnegie Hall, The Rainbow.

The first touring “light show,” as it was at the Fillmore, was with Jefferson Airplane. Chris was the production manager and describes some of the challenges with a system, at a time when mobile touring equipment was never used before:

“At the Swedish Orchestra Hall (where the Nobel prizes are awarded), finding scaffolding or some arrangement, near the rear of the stage to support the light show equipment was difficult and overcome, but the strangest part was organizing the hoses to and from the dishwasher, which was also on the tour, because the oily plates [clock faces] needed to be cleaned as the show progressed. The hose had to be routed to the basement, along with the main supply for the distro which operated the light show.”

Another notable challenge was transporting the light show through European borders. Carnet document lists coincide with equipment specific to the cases in which it was packed. The problem was that the light show crew randomly packed it differently in each road case and opening these for required customs inspection always included a few surprises when compared to the list. Often these problems were resolved with a complimentary handing out the bands’ record albums.

Chris Langhart said:

“The idea of American bands touring was embraced by the record companies because it could extend the performers’ influences to new markets. However, touring was still an experiment for record companies and there was no proof yet that doing this would result in extra dollars. Thereby, touring lighting did not seem sensible to them. So we made the best of every venue’s equipment, bending it to our needs as required, moving it within whatever limitations the venue would tolerate, and changing the color and direction. More backlighting than front lighting was not common in these places. By watching us, I’m sure these (mostly European) venues gained a new understanding of what rock music lighting was supposed to be, especially the part about combinations of heavy colors from various directions and timing

changes. Not your sort of folksong group on a mostly front lit white stage anymore.”⁴

JOSHUA WHITE (JOSHUA LIGHT SHOW, FILLMORE EAST)

The first Joshua Light Show was performed with *Frank Zappa & The Mothers of Invention* in 1967 (Figure 2.9). Earlier work creating psychedelic environments started with a company called Sensefex, lighting in discotheques in the mid-1960s. The studio and shop was a small space that was formerly a doctor’s office in New York City.

Formally pursuing the lighting craft, Joshua White spent two years at Carnegie Tech (now Carnegie Mellon) studying lighting and two years at USC film school (University of Southern California) studying cinematography. He dropped out in 1964. It was the same year The Beatles came to America and the “British Invasion” brought rock & roll to America.

In the summer of 1967 Joshua & Co. was hired by San Francisco promoter/producer Bill Graham to provide lighting support during a week of concerts in Toronto with the Grateful Dead and Jefferson Airplane. Up until then, the psychedelic light show had only been in ballrooms and their equipment was crammed into a balcony space. In Toronto, the O’Keefe Center was a modern traditional theatre and presented a host of new technical problems that needed to be solved.

Unlike their bay area colleagues, Joshua’s group were theatre professionals, with credentials from Carnegie Tech drama school. The team devised a plan to rear project on a large screen. This clever design choice allowed the promoter to sell hundreds of dollars in balcony seats. Joshua specified the original 20' × 30' pola-coat high transmission screen, had it fabricated, and designed a light weight touring frame. This type of screen was common in theatre and opera, but unknown in the birth of “modern” rock & roll.

The night of the concert, the legendary Chip Monck was unable to come at the last minute and Joshua called the lights. At the time “lights” meant

⁴ Interview (2015) with Chris Langhart, NYU, TD Fillmore.



FIGURE 2.9 Frank Zappa and the Mothers of Invention, 1967 (Photo by Joshua White)

a few color washes and some follow spots and he operated and called the show sitting in the front of house position. After eight performances, Joshua was hooked on the music, but more importantly, intensely studied the light show from an audience's perspective and saw his future.

The rear screen light show took careful attention to details to achieve. In ballrooms, the light show provided decor and stage lighting. But in a theatrical context, the lights needed to align with the music. Joshua said, "Initially that meant listen, start when they start, change when they change, stop when they stop. In almost 50 years, those rules have not changed much." When the shows were over, Joshua "volunteered" to take the screen and frame back to New York.

In December 1967 more light shows were performed in a theatre in New York for a music festival. Shortly after, Bill Graham decided to buy an old theatre on Second Avenue and Joshua was hired as the full time light show for the Fillmore East. Relieved of the pressure of setting up and striking, the permanent venue allowed time, energy, and extensive growth. Joshua said:

"When we did our first shows before the Fillmore, the theatres were wired with DC. We had just enough AC to run the sound and our motors. Everything else was on dimmers. I ran the dimmers turning the projectors on and off.

The only DC dimmer at the time was the standard resistance type, referred to as piano boards. These units were big and heavy. I mixed the original light show on my knees with my back to the screen. The Fillmore had more AC so the mixing was done using 6x2500 watt auto transformers. After six months of this, we were in a position to buy electronic dimmers. One of the young sound engineers at the Fillmore also worked for Skirpan electronics. We were able to afford 12 Skirpan dimmers and a small manual control box. This changed everything artistically because I was able to make the most simple changes with a simple movement of my fingers allowing me to run other light show ideas. The essence of the light show has always been improvisation."

Joshua Light Show was paid \$1,000 per week unless the shows sold out in which case the fee rose to \$1,100. It was just enough money for the six team members to survive (Figure 2.10).

Before light shows, there was nothing but black curtains and a few follow spots. Joshua adds, "The ballrooms in San Francisco used the light show to hide the basic shabbiness of those spaces and also to light the band. In New York it was a theatre. The audience sat in reserved seats and as the biggest visual thing, we felt a responsibility to support the entire experience."



FIGURE 2.10 Joshua Light Show Team (Photo by Amalie R. Rothschild)

Joshua said, “The Fillmore East was ground zero for rock & roll lighting.” The experience were performances by The Who in a week-long engagement of “Tommy”, *Jimi Hendrix*, *Janis Joplin*, *The Doors*, *Santana*, and *Sly & the Family Stone*. So confident of Joshua Light Show, Bill Graham added a clause in the artist’s contract that stated they must use the light show at Fillmore East.⁵

BOB SEE (SEE FACTOR)

Started in 1971, See Factor was owned by Bob See. Bob was a lighting designer for the James Gang, David Bowie, and Aerosmith among many others and he mainly established the company to provide equipment to his clients.

His first office was located over the Fillmore East Theatre on 2nd Avenue in New York City (Figure 2.11). In 1968, NYU had a new conservatory-style theatre program in a building next door to the Fillmore, an old movie theatre. He and a few of his NYU classmates noticed renovations there and curiously walked in. Bob started work there ten days before it opened, and a year and a half later became the technical director with Bill Graham as his mentor, until a few weeks after it closed in 1971. The Fillmore

East was host to *Jimi Hendrix*, *the Grateful Dead*, *Janis Joplin*, *Jefferson Airplane*, and *The Doors*; only a few of the hundreds that he witnessed performing there.

Bob perfected building and packaging roadworthy shows, namely instituting a system of road boxes with common dimensions to facilitate truck packing and then color coding them to facilitate distribution of equipment on site. He expanded the company into a full service shop. Everything was custom made for each tour. He once designed an “A” shaped truss rig, fully loaded with PAR lighting that would sit flat on the stage and pivot to stand straight up at the peak of the show. His NYC operation expanded to Los Angeles and London and became the training ground for hundreds of people, many still working throughout the industry today.

In the 1990s, Bob See helped revolutionize film and television studio work by initiating his trade secrets learned from concert touring and introduced dimming and control and making arena rigging concepts an option in studio grids for shows and movies, for example *The Sopranos*, *Sex and the City*, *The Departed*, and many more projects. Today, See Factor continues work in all facets of entertainment lighting and is still an independently owned lighting company.⁶

⁵ Interview (2015) with Joshua White, Joshua Light Show.

⁶ Interview (2015) with Elliot Krowe. See Factor designer in 1976 and www.seefactor.com/history.



FIGURE 2.11 Aerial view of Fillmore East (Photo by Amalie R. Rothschild)

RUSTY BRUTSCHE, KENY WHITRIGHT, JACK CALMES (SHOWCO)

The essential aspect of the “live” *Led Zeppelin* sound required a sound system capable of producing high energy volume for upwards of 50,000 people a

night. The Showco sound company, Rusty Brutsche, with Keny Whitright, speaker design specialist with Showco, was Led Zeppelin’s sound company since the group’s first US performance in December 1968 (Figure 2.12).

Showco became a full sound, staging, and lighting production company. Originally conceived by Jack Calmes in 1969 as a management company, Calmes



FIGURE 2.12 Led Zeppelin lighting scaffold support system, 1977 (Photo by Neal Preston)